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6GSNS



AI-Powered 6G Networks: Secure, Energy-Efficient and High-Speed End-to-End Communication supporting Sensing and Mobility

6G-CATS – PROJECT OVERVIEW

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6G-CATS at a glance

- **Title:** ***AI-Powered 6G Networks: Secure, Energy-Efficient and High-Speed End-to-End Communication Supporting Sensing and Mobility (GA No.101287162)***

- **European Call:** HORIZON-JU-SNS-2025-01
- **Topic:** HORIZON-JU-SN-2025-01-STREAM-B-03-02
- **Duration:** 36 months *(September 2026 – August 2029)*
- **Overall budget (requested grant)** of ~7.999.445,00 Euro (837,50 PMs)
- **Consortium members:** 15 partners (from 7 EU countries: GR , ES, AT, DK, IT, SI, FR)
- **Project Coordinator:** Hellenic Telecoms Organization SA - OTE (GR) / Hellenic Telekom

Scope:

- *6G-CATS will build an AI-powered, disaggregated and secure 6G optical infrastructure, capable of supporting sensing and mobility in a sustainable manner.*
- *It combines high-speed optical access and metro technologies with real-time intelligence, end-to-end resiliency and native security.*
- *With its multi-disciplinary agenda, it provides a concerted effort towards high-speed optical access and metro technologies that seamlessly integrate optical sensing capabilities to enable network intelligence through a multi-functional AI framework.*

6G-CATS: Essential Objectives

1. Design a new sustainable, scalable and AI-driven network architecture
2. Develop & evaluate High-speed and energy-efficient integrated photonic and wireless infrastructure
3. Implement a methodology for infrastructure-based and local optical sensing that leverages multiple sensing modes and applies them to support resiliency, security and mobility
4. Develop an End-to-end, quantum-resilient and AI-enhanced security framework for 6G
5. Design and develop an AI-assisted control plane and orchestration framework
6. Perform end-to-end integration, demonstration and validation across diverse use-cases
7. Impact creation towards an integrated, sustainable, secure AI-powered 6G architecture

6G-CATS: The Problem We Signed Up To Solve

Eight design principles underpin the 6G architecture according to SNS-JU and Hexa-X-II blueprints— However, today's optical access network meets very few of them!

Intelligence
Support and exposure of 6G services beyond connectivity; full automation through distributed AI/ML, observability and analytics

Flexibility
Deployment across terrestrial and non-terrestrial planes; scalability from small to large, with real-time adaptation

Trustworthiness
Resiliency and availability for coverage and disaster recovery; persistent security and privacy under zero-trust assumptions

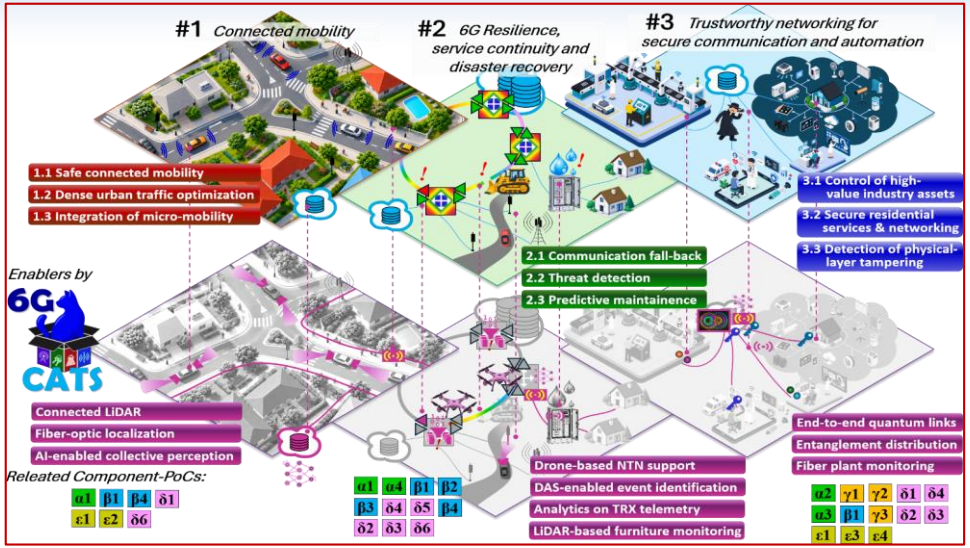
Efficiency & Sustainability
Cloud optimisation and network migration; a low material and energy footprint while enabling new use-cases

Where the optical layer falls short today: 6 gaps

- IM/DD PON and fronthaul technology dominates — ***energy per bit does not scale to 6G throughputs***
- Sensors sit alongside the infrastructure ***but neither collaborate nor fuse their data***
- Sensing technologies ***are optimised for non-telecom deployments***
- Network control is simple and per-application-domain, ***not AI-native***
- *Optical quantum communication remains limited* to fixed, high-value users
- ***Network architectures are simple and inflexible***, tied to specific wavebands

IM/DD PON: Intensity Modulation-Direct Detection Passive Optical Network

6G-CATS: Essential Use Cases



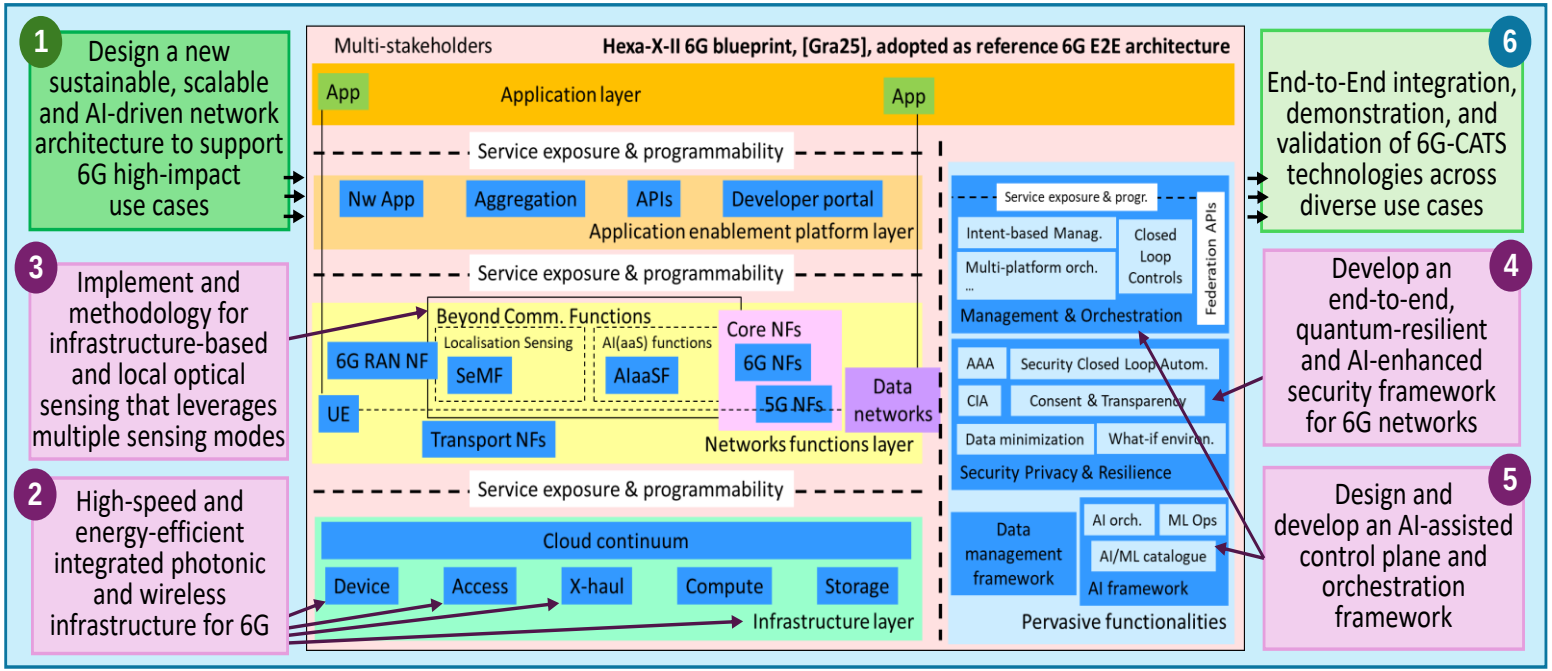
6G-CATS will demonstrate the capabilities of a future 6G network in line with three high-impact use-cases:

- ***Connected mobility** will foster safe transport of people and goods, while allowing traffic optimization and a sustainable integration of micro-mobility, at the same time.*
- ***Service continuity and automatic disaster recovery** will be demonstrated through TN/NTN integration, physical-layer and environmental threat detection (e.g. water infiltration) and predictive maintenance.*
- ***6G-ready security stacks** leveraging quantum-resilient control of high-value assets and residential access with intent-based service translation, as well as detection of physical-layer tampering.*

6G-CATS will validate these innovations in a Stream-C experimentation platform.

6G-CATS in the 6G-Architecture

6G-CATS contributions to the Hexa-X-II 6G blueprint



Website: **https://www.6g-cats.eu/**
LinkedIn: https://www.linkedin.com/company/6g-cats
Facebook: https://www.facebook.com/6gcats
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X: https://x.com/6gcats
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Thank You!

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